

**CENTRAL ELECTRICITY REGULATORY COMMISSION**

**NEW DELHI**

**Petition No. 606/MP/2020**

**Coram:**

**Shri I. S. Jha, Member  
Shri Arun Goyal, Member  
Shri P.K. Singh, Member**

**Date of Order: 16.12.2022**

**In the matter of**

Petition under Regulations 11, 26 and 29 of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 read with other relevant provisions and Commission's directions in the order dated 20.3.2017 in Petition No. 72/MP/2016.

**And**

**In the matter of**

Maithon Power Limited (MPL),  
34, Sant Tukaram Road,  
Carnac Bunder, Mumbai-400009

**...Petitioner**

**Versus**

1. Tata Power Delhi Distribution Limited,  
NDPL House, Hudson Lane,  
Kingsway Camp, New Delhi – 110009.
2. Damodar Valley Corporation,  
Headquarters, DVC Towers, VIP  
Road, Kolkata– 700054.
3. West Bengal State Electricity Distribution Company Limited,  
Vidhyut Bhavan (8<sup>th</sup> Floor), Bidhan Nagar, Block-DJ, Sector-II,  
Salt Lake, Kolkata – 700091.
4. Kerala State Electricity Board Limited (KSEBL),  
Vydyuthi Bhavanam, Pattom, Thiruvananthapuram – 695004.
5. Tata Power Trading Company Limited Corporate Centre,  
A-Block, 34, Sant Tukaram Road,  
Carnac Bunder, Mumbai – 400006.
6. Central Electricity Authority  
Sewa Bhawan, R.K. Puram, Sector-1,  
New Delhi – 110066.

**...Respondents**



**For Petitioner:** Shri Anand Kumar Shrivastava, Advocate, MPL  
Shri Shivam Sinha, Advocate, MPL  
Shri Chetan Saxena, Advocate, MPL  
Shri Pankaj Prakash, MPL  
Shri Dhilip Kumar, MPL

**For Respondents:** None

### **ORDER**

Maithon Power Limited (MPL) has filed the present petition for in-principle approval of the expenditure proposed to be incurred by MPL in order to comply with the NOx norms prescribed by Ministry of Environment, Forest and Climatic Change ("MoEFCC"), vide its notification dated 7.12.2015 ("MoEFCC 2015 Notification"), under the Environment (Protection) Amendment Rules, 2015 ("Amendment Rules") amending/ introducing certain emission norms which are to be complied with by all the thermal power plants (TPP's) operating within the country.

2. The Petitioner has made the following prayers:

- a. *"Admit the present petition;*
- b. *Grant in-principle approval to the Petitioner to incur the expenditures (including Capex and Opex) (depending upon the finalization of the emission parameter) as detailed under this Petition for meeting the revised emission norms in respect of NOx;*
- c. *Approve the estimated capital cost of Rs 198.37 Crores for meeting the Nox norm of 300 mg/Nm<sup>3</sup> subject to true up / actual cost incurred or alternatively, grant liberty to the Petitioner to approach this Hon'ble Commission to file separate Petition with firmed up cost in case 300 mg/Nm<sup>3</sup> norm is retained by the MoEF&CC;*
- d. *Approve the estimated total capital cost of Rs. 51.47 crores for meeting the NOx norm of 450 mg/Nm<sup>3</sup> (subject to true-up based on prudence check);*
- e. *Approve the parameters proposed in the present petition in relation to estimated increase in O&M Expenses, Operating Norms like Auxiliary Power Consumption and SHR, spares, water charges, landed cost of reagents (solid urea prills), cost etc. with corresponding increase in Capacity Charges and ECR as detail above;*
- f. *Exclude the period of shutdown (required for installation of NOx abatement system) for the purposes of calculating the Availability of the Project to the extent it cannot be not synchronized with annual shutdown or allow opportunity cost to this extent and ensure full recovery of shortfall in AFC due to such shutdown;*



- g. *Allow the prayer of the Petitioner not to consider the increased ECR for the Petitioner's Project on account of DeNOx installation for preparation of stack of merit order dispatch till all participating generators comply with the revised emission norms but allow increased ECR to be recovered in billing;*
- h. *Allow the Petitioner to (i) seek requisite modifications in the granted LTA on account of reduction in the Net Capacity of Project (ii) Modification in formulae for Availability, ECR and PLF due to increased Auxiliary Power Consumption due to proposed ECS installation;*
- i. *Grant leave to the Petitioner to approach this Hon'ble Commission for determination of Supplementary tariff for De-NOx System at appropriate stage;*
- j. *Grant liberty to the Petitioner to approach this Hon'ble Commission by way of separate petition(s) for remaining ECS, if any, which is not being proposed presently, but may be required to be installed in order to comply with the revised emission norms;*
- k. *Condone any inadvertent omissions/errors/rounding-off differences/ shortcomings and permit the Petitioner to add/alter this filing and make further submissions as may be required in future;"*

### **Background**

3. The background of the instant petition is as follows:

- a) The Petitioner is a Joint Venture between the Tata Power Company Ltd. ("Tata Power") and Damodar Valley Corporation ("DVC") wherein Tata Power has 74% shareholding and DVC has with 26 % shareholding of MPL.
- b) The Petitioner has set up Maithon Right Bank Thermal Power Project, ("MRBTPP /Project") having installed capacity of 1050 MW (2x525 MW) at Dhanbad, Jharkhand and operating the same. The COD of unit I and II are 1.9.2011 and 24.7.2012, respectively.
- c) The Petitioner had contracted the entire Installed Capacity of the Project by entering into Power Purchase Agreements ("PPA") with Respondents No. 1 to 4 i.e. Tata Power Delhi Distribution Limited ("TPDDL"), DVC, West Bengal State Electricity Distribution Company Ltd ("WBSEDCL") and Kerala State Electricity Board Limited ("KSEBL") and Power Sale Agreements ("PSA") with Respondent No. 5 i.e. Tata Power Trading Company Limited Corporate Centre.
- d) In exercise of the powers conferred under sections 6 and 25 of the Environment

(Protection) Act, 1986, (hereinafter referred to as “the 1986 Act”), MoEF&CC vide its Notification No. S.O. 3305(E) dated 7.12.2015 has amended the Environment (Protection) Rules, 1986 introducing revised standards for emission to be followed by all existing and new TPPs. As per the MoEFCC Notification, all TPPs were mandatorily required to comply with the revised standards within a period of two years from the date of the MoEFCC Notification. The said Amendment Rules had (a) Revised emission parameters of Particulate Matter (b) Introduced new parameters qua Sulphur Dioxide (“SO<sub>2</sub>”), Oxides of Nitrogen (“NO<sub>x</sub>”) and Mercury (c) All Thermal Power Plants with Once Through Cooling (“OTC”) shall install Cooling Towers and (d) Introduced a limit to the amount of water to be used by TPPs. The amended norms prescribed by the MoEFCC Notification are as follows:

<b>Sr. No</b>	<b>Industry</b>	<b>Parameter</b>	<b>Standard</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>“5A.</b>	<b>Thermal Power Plant (Water consumption limit)</b>	<b>Water consumption</b>	<p><b>I.</b> All Plants with Once Through Cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption up to maximum of 3.5m<sup>3</sup>/MW/hr within a period of two years from the date of publication of this notification.</p> <p><b>II.</b> All existing CT-based plants reduce specific water consumption up to maximum of 3.5m<sup>3</sup>/MW/hr within a period of two years from the date of publication of this notification.</p> <p><b>III.</b> New Plants to be installed after 1<sup>st</sup> January 2017 shall have to meet specific water consumption upto maximum of 3.0 m<sup>3</sup>/MW/hr and achieve zero waste water discharge.</p>
<b>“25.</b>	<b>Thermal Power Plant</b>	<b>TPPs (Units) installed before 31<sup>st</sup> December, 2003*</b>	

	<i>Particulate matter</i>	100 mg/Nm <sup>3</sup>
	<i>Sulphur Dioxide (SO<sub>2</sub>)</i>	600 mg/Nm <sup>3</sup> (Units Smaller than 500 MW capacity units) 200 mg/Nm <sup>3</sup> (for units having capacity of 500 MW and above)
	<i>Oxides of Nitrogen</i>	600 mg/Nm <sup>3</sup>
	<i>Mercury (Hg)</i>	0.03 mg/Nm <sup>3</sup> (for units having capacity of 500 MW and above)
	<b>TPPs (units) installed after [1<sup>st</sup> January, 2004]<sup>#</sup>, upto 31<sup>st</sup> December, 2016</b>	
	<i>Particular Matter</i>	50 mg/Nm <sup>3</sup>
	<i>Sulphur Dioxide (SO<sub>2</sub>)</i>	600 mg/Nm <sup>3</sup> (Units smaller than 500 MW capacity units) 200 mg/Nm <sup>3</sup> (for units having capacity of 500 MW and above)
	<i>Oxides of Nitrogen (NO<sub>x</sub>)</i>	300 mg/Nm <sup>3</sup>
	<i>Mercury (Hg)</i>	0.03 mg/Nm <sup>3</sup>
	<b>TPPs (units) to be installed from 1<sup>st</sup> January, 2017<sup>**</sup></b>	
	<i>Particular Matter</i>	30 mg/Nm <sup>3</sup>
	<i>Sulphur Dioxide (SO<sub>2</sub>)</i>	100 mg/Nm <sup>3</sup>
	<i>Oxides of Nitrogen (NO<sub>x</sub>)</i>	100 mg/Nm <sup>3</sup>
	<i>Mercury (Hg)</i>	0.03 mg/Nm <sup>3</sup>

*TPPs (units) shall meet the limits within two years from date of publication of this notification.*

*\*\*Includes all the TPPs (units) which have been accorded environmental clearance and are under construction".*

*# amended vide Gazette Notification No.590 dated 7.3.2016*

*publication of this notification.*

*\*\*Includes all the TPPs (units) which have been accorded environmental clearance and are under construction".*

*# amended vide Gazette Notification No.590 dated 7.3.2016*

- e) The Petitioner filed Petition No. 72/MP/2016 before the Commission seeking in-principle approval for implementation of Emission Control System (ECS) for abatement of SO<sub>2</sub> and NO<sub>x</sub>. The Commission vide order dated 20.3.2017 disposed of the said petition and directed the Petitioner to approach CEA and MoEF&CC for suitable technology and timelines for implementation. To expedite the implementation of new environmental norms, the Petitioner separated the process of approval for SO<sub>2</sub> abatement technology from NO<sub>x</sub> abatement technology. Subsequently, the Petitioner filed petition No. Petition No. 152/MP/2019 for

implementation of SO<sub>2</sub> norms. As regards NO<sub>x</sub>, CEA conveyed to the Petitioner that a consensus has been reached between EPCA, Ministry of Power (MoP), Central Pollution Control Board (CPCB), CEA, NTPC and MoEF&CC to revise the NO<sub>x</sub> norms from 300 mg/Nm<sup>3</sup> to 450 mg/Nm<sup>3</sup> for TPP's installed between 1.1.2004 to 31.12.2016. However, the same was not notified at the time of the filing of present petition by the Petitioner.

- f) Accordingly, the instant petition has been filed with the technologies and their cost for meeting the norm of 450 mg/Nm<sup>3</sup> as well as 300 mg/Nm<sup>3</sup> along with the impact on operational parameters such as Heat Rate, Auxiliary Consumption etc., which will affect the tariff.

#### **Submissions of the Petitioner**

4. The gist of the submissions made by the Petitioner are as follows:

- a) The Petitioner has submitted that at present the Project is operated as per the new limits specified by the Amendment Rules in relation to Water Consumption, Particulate Matter and Mercury. However, the norms specified for SO<sub>2</sub> (200 mg/Nm<sup>3</sup>) and NO<sub>x</sub> (300 mg/Nm<sup>3</sup>) has to be complied with and the same can be met by way of (a) installation of Flue Gas De-Sulphurization ("FGD") Plant to meet the SO<sub>2</sub> norms and (b) installation of NO<sub>x</sub> abatement system along with associated Electrical System Modification (ESM) and Civil Foundations.
- b) Accordingly, Petitioner had filed a Petition No. 72/MP/2016 seeking in-principle approval for the expenditure proposed to be incurred for complying with above SO<sub>2</sub> and NO<sub>x</sub> norms. The Commission vide order dated 20.3.2017 directed the Petitioner to approach CEA with regard to optimum technology, associated cost, major issues to be faced in installation of revised environmental standards etc., and the MoEF&CC for phasing the implementation of different environmental measures. The Petitioner

was also granted liberty to approach the Commission after obtaining the approval from CEA and direction of MoEF&CC on the above aspects. The relevant portion of the order dated 20.3.2017 is as follows:

*“10. Since, the 2014 Tariff Regulations do not provide for the grant of in-principle approval for the capital expenditure, the prayer of the petitioner for in-principle approval of the Abstract scheme of capital expenditure by relaxing the provisions of the tariff regulations through invoking Regulation 54 of 2014 Tariff Regulations, is not maintainable. In our view, since, the implementation of new norms in the existing and under construction thermal generating stations would require modification of their existing system and installation of new systems such as Retro-fitting of additional fields in ESP/replacement of ESP, etc. to meet Suspended Particulate Matter norms, installation of FGD system to control SO<sub>2</sub> and Selective Catalytic Reduction (SCR) systems for DeNox, the petitioner is directed to approach the Central Electricity Authority to decide specific optimum technology, associated cost and major issues to be faced in installation of different system like SCR, etc. The petitioner is also directed to take up the matter with the Ministry of Environment and Forest for phasing of the implementation of the different environmental measures. Accordingly, the petitioner is granted liberty to file appropriate petition at an appropriate stage based on approval of CEA and direction of MoEF which shall be dealt with in accordance with law.”*

- c) Pursuant to the directions of the Commission in Petition No. 72/MP/2016 and to expedite the implementation of new environmental norms, the Petitioner separated the process of approval for SO<sub>2</sub> abatement technology from NO<sub>x</sub> abatement technology. Accordingly, the Petitioner on 6.4.2017 approached MoEF&CC and CEA for further guidance and submitted prefeasibility study for FGD system.
- d) On 11.12.2017, in exercise of powers conferred under Section 5 of the Environment (Protection) Act, 1986, the Central Pollution Control Board, MoEF&CC inter-alia issued direction to the Petitioner to install FGD System by September 2021 and June 2022 for Unit 1 and 2 respectively and take immediate measures like installation of low NO<sub>x</sub> burners, providing Over Fire Air (OFA) etc. and comply with NO<sub>x</sub> emission limit by the year 2022.
- e) Thereafter, CEA vide letter dated 8.1.2019 provided the suggestive technology and indicative cost for installation of FGD system at the generating station of the Petitioner. Accordingly, the Petitioner filed separate Petition No. 152/MP/2019 for

approval of capital cost of FGD separately. The Commission vide order dated 11.11.2019 in Petition No. 152/MP/2019 accorded the “in-principle” approval for installation of FGD system.

- f) In the meantime, the Petitioner submitted feasibility study of proposed NOx abatement system to CEA on 14.11.2018. Further, the Petitioner had discussions with various vendors on NOx abatement system and based on the same, the Feasibility Report (FR) was revised and submitted to CEA on 30.4.2020. This report mentioned two technologies for NOx abatement i.e. ‘*In Combustion Control*’ and ‘*Post Combustion Controls*’ (Selective Non-Catalytic Reduction (SNCR) and Selective Catalytic Reduction (SCR)).
- g) ‘*In Combustion Control*’ technology is the most suitable for meeting the norm of 450 mg/Nm<sup>3</sup> and ‘*In Combustion Control*’ technology along with SNCR (Post Combustion Control) is for meeting the norms of 300 mg / Nm<sup>3</sup> for the Project of the Petitioner.
- h) CEA vide its letter dated 19.6.2020, accorded its approval to go ahead with NOx abatement system for meeting the norm of 450 mg/Nm<sup>3</sup> in line, and to approach the Commission for approval of tariff implication. The relevant extracts of CEA’s letter dated 19.6.2020 is as follows:

*“This is with reference to your letter dated 30.4.2020, vide which revised feasibility report for NOx abatement in MPL boilers for complying new emission norms of MOEF&CC dated 07.12.2015 was sent to CEA and approval for NOx abatement was sought.*

*It is to draw your attention on the Record of Proceedings of Hon’ble Supreme Court of India dated 5th August 2019 (copy enclosed as Annexure A), that a consensus has been reached between EPCA, Ministry of Power, Central Pollution Control Board (CPCB), Central Electricity Authority (CEA), NTPC and MoEF&CC and they agreed in principle to revise the NOx norms from 300 mg/Nm<sup>3</sup> to 450 mg/Nm<sup>3</sup> for Thermal Power Plants installed between 01/01/2004 to 31/12/2016. Hon’ble Supreme Court ordered to take action on the basis of the consensus that has been reached.*

*Hence, pursuant to ‘in-principle’ approval from Hon’ble Supreme Court of India, the normative value of NOx for unit >500 MW and installation date between year 2003-2016 shall be considered as 450 mg/Nm<sup>3</sup>. However, notification of revision of norms by MoEF&CC is yet to be notified.*



*Therefore, with reference to 'in-principle' approval from Hon'ble Court, MPL may consider the suitable NOx abatement technology accordingly on the condition that MPL shall comply the revised NOx norms on continuous monitoring or periodicity basis (whatever the case may be) and MPL shall be accountable for any violation of the above mentioned norms. In regard of tariff accountable to expenditure towards NOx abatement, MPL may approach the regulatory commission along with tariff petition."*

- i) The Hon'ble Supreme Court in order dated 5.8.2019 in MC Mehta Vs Union of India observed that during a meeting between EPCA, MoP, CPCB, CEA, NTPC and MoEF&CC, a consensus was reached that there may be operational issues with SNCR technology and SCR system are not proven for Indian coal having high ash content. After detailed discussions, it was agreed in-principle to revise the NOx norms upwards to 450 mg/Nm<sup>3</sup>. However, final decision on these issues was based on the outcome of the pilot projects. Further, in-principle agreement between EPCA, MoP, Central Pollution Control Board (CPCB), CEA, NTPC and MoEF&CC was reached to revise the NOx norms to 450 mg/Nm<sup>3</sup> and the same was also informed to the Hon'ble Supreme Court, which also directed the authorities to act on the consensus reached. However, the concerned authorities did not to take appropriate action in this regard.
- j) Accordingly, the Petitioner at the time of filing of instant petition and in the absence of clarity on the final norms of NOx had sought bids separately for meeting applicable norm of 300 mg/Nm<sup>3</sup> and the expected norm of 450 mg/Nm<sup>3</sup>.
- k) Thus, in the interest of time and as a prudent measure, the Petitioner proposed to implement either the norm of 300 mg/Nm<sup>3</sup> through 'In Combustion' along with SNCR technology or to implement only 'In Combustion Control Technology' in first stage for meeting the norm of 450 mg/Nm<sup>3</sup> and the implementation of SNCR System in the second stage for meeting the norms of 300 mg/Nm<sup>3</sup>. Accordingly, the Petitioner made two separate prayers for approval of cost of 450 mg/Nm<sup>3</sup> in the prayer (d) and cost of meeting norm of 300mg/Nm<sup>3</sup> in prayer (c).
- l) **'In Combustion Control Technology'** includes implementation of solutions based

on the CFD analysis, Low NOx Burner, Separated Over Fire Air Ports (SOFA), combustion optimization etc. and the same reduces the NOx emissions for operation of unit in 40% - 100% load range. Under this, the improved staging and precise stoichiometry control of secondary air results in reduced NOx emissions but increase the unburnt carbon, which necessitates for advanced pulverizers, hardware and software tools for balanced fuel distribution.

- m) In '**Post Combustion Control Technology**' (**SNCR**), urea solution (40% concentrated) is injected into the high temperature zone of the furnace (850°C to 1100°C), which requires dry urea handling system, DM water for dilution, liquid urea storage, transportation system etc, and the NOx will be < 300 mg / Nm<sup>3</sup> at 6 % O<sub>2</sub> on dry basis for 40-100 % loading.
- n) 'In Combustion Modification' is implemented in 12 months and 'In Combustion Modification with SNCR' is implemented in 16 months for each unit. Further, one month outage (from unit cooled down condition to boiler light up) for each unit is required for retrofitting the above technology. The minimum time gap between completion of two units will be of two (2) months.
- o) In compliance of the provisions of Regulation 29 of the 2019 Tariff Regulations, the Petitioner has already submitted its proposals to the beneficiaries for giving their views vide letters dated 27.6.2020 and 24.7.2020
- p) The Petitioner will file a separate supplementary tariff petition in terms of Regulations 29(4) of the 2019 Tariff Regulations based on actual and projected expenditure.
- q) Apart from an impact on capacity charges, there would also be other cost implications mainly pertaining to O&M Expenses, Auxiliary Power Consumption (APC), increase in SHR etc. The O&M Expenses would also increase on account of the running Operation Cost of the consumables like Solid Urea Prills and DM Water for the De-NOx system towards operation of the new facilities for SNCR.

- r) The Maintenance Spares and services of contracted/outsourced manpower would also be required to ensure the availability and reliability of the system for both In Combustion modification and SNCR. All these will lead to increase in Annual Fixed Cost (AFC) and, hence, Capacity Charges over rest of the life of the Project.
- s) The existing per unit capacity charge at normative PLF of 85% will increase not only because of increase in AFC but also due to increase in Auxiliary Consumption (SNCR) and SHR (In-combustion) due to ECS. The existing energy charge rate will also increase due to additional reagent cost and increase in auxiliary consumption (SNCR) and SHR (In-combustion).
- t) The Petitioner has prayed to consider Auxiliary Consumption of 0.05% for each unit for DeNOx system in addition to the Normative Auxiliary Consumption of 6.25% applicable as per the 2019 Tariff Regulations, for the Petitioner's Project in case of implementation of SNCR system. Further, the said Auxiliary Consumption of 0.05% is based on projected levels of operation of plant (PLF) and DeNOx system and it is likely that the same may be higher or lower than this projection based on actual level of operation of plant and DeNOx system.
- u) When the generating units operate at part load, there may be some reduction in absolute value (in kWh) of Auxiliary Consumption, however, its reduction in terms of percentage will not be in the same proportion and hence percentage Auxiliary Consumption at part load may be higher than that at TMCR condition. Accordingly, the Petitioner has prayed that said Auxiliary Consumption may be trued up based on actuals subsequently or replaced by the norms to be specified by Commission if available at that time. The said Additional Auxiliary Consumption would have impact on the lowering of Declared Capacity ("DC") and Change in Availability Formula. Further, there would be a reduction in LTA capacity for beneficiaries due to Lower DC and a change in PLF formula.

- v) The Petitioner has prayed for water charges and has proposed that water consumption of 5.5 m<sup>3</sup>/hr @ ₹20/m<sup>3</sup> may be approved in case SNCR is required to be installed.
- w) The additional O&M on Manpower/ Spares Cost has been considered at 5% of total capex based on the estimated Manpower and Maintenance spares required to operate and maintain the DeNOx system for Petitioner's Project of 2x525 MW. Accordingly, the Petitioner has sought leave of the Commission to allow true up of this cost based on actuals subsequently.
- x) The actual consumption of Solid Urea Prills in SNCR would depend on actual PLF and quality/ purity of Reagent and Coal received at site. The cost of Urea Prills would depend on the lowest cost discovered after bidding as per the Regulations. The Petitioner has proposed the consumption of Solid Urea Prills at 660 kg/hr with estimated design NOx emission level of 880 mg/Nm<sup>3</sup>, which may vary based on final design/coal parameters used. However, the consumption of Solid Urea Prills will depend upon the purity and properties of the Reagent actually procured through competitive bidding. Solid Urea Prills Cost is proposed as ₹38/kg. Accordingly, allow true up of these consumption and cost parameters based on actuals subsequently in case SNCR is required to be installed.
- y) There will be an impact on existing Energy Charge Rate ("ECR") without Reagent Cost as well as ECR with Reagent Cost after installation of DeNOx system (SNCR) due to Additional Auxiliary Consumption. It is also anticipated the installation of DeNOx system ("In-Combustion") may also have an adverse impact on boiler efficiency by about 0.8% thereby increasing Station Heat Rate (SHR) by about 22 kCal/kWh and, thus on ECR. Therefore, allow the said increased Station Heat rate and ECR during Supplementary Tariff Petition stage or true-up exercise post installation of DeNOx system.

- z) Pursuant to installation of FGD and DeNOx systems at Petitioner's Project, Petitioner will be in a disadvantageous position in getting dispatched on Merit Order Dispatch ("MOD") principle due to higher ECR. This will give unfair and unintended advantage, of getting priority in MOD, to plants that have not installed ECS such as FGD and DeNOx. The Petitioner has proposed that even after installation of ECS, for MOD purposes, the ECR formula may be used taking both Reagent Consumption and landed price of Reagent as zero and Auxiliary Consumption as per approved norms without installation of ECS and till all ECSs are installed, the Merit Order may be run without any reference to additional ECR. However, payment for Supplementary Energy Charges for ECS, with impact of Reagent Cost, Auxiliary Consumption and SHR, may be done over and above the ECR used for Merit Order purpose.
- aa) The cost of maintenance spares have been assumed at 20% (as per the provision of the Regulation 34(a)(iv) of the 2019 Tariff Regulations. Similarly, cost of Solid Urea Prills (for SNCR) for 30 days and stock for 20 days needs to be considered in line with Regulation 34(a)(i) and Regulation 34(a)(ii) of the 2019 Tariff Regulations.
- bb) The cost of Capital Spares projected or actually consumed after installation of DeNOx System will be claimed subsequently in the supplementary or true-up tariff petition based on realistic projections or actual consumption, as the case may be.
- cc) Accordingly, the additional Auxiliary Consumption may be trued up based on actuals subsequently or replaced by the norms to be specified, if available at that time. Further, the said Additional Auxiliary Consumption would have impact on the lowering of DC and change in availability formula. Further, there would be a reduction in LTA capacity for beneficiaries due to lower DC and a change in PLF formula.
- dd) The cost of NOx abatement system includes electrical system modification and civil foundations. The cost estimate proposed for "In-Combustion" modification is based on L1 Bidder cost arrived through open tendering process. There would also be other cost

implications because of the proposed NOx abatement system mainly pertaining to reagent cost, water cost, maintenance spares and services of contracted/ outsourced manpower would also be required to ensure the availability and reliability of systems.

ee) One month shutdown period per unit is required for hook-up and commissioning of NOx abatement system. In case, it is not possible to retrofit system within planned outage, this shutdown period be considered as “deemed availability” for payment of capacity charges.

ff) The Petitioner has computed the levelized value of likely or indicative impact on tariff over the balance useful life of the Project (average of both the Units) post installation of In-Combustion DeNOx system as about ₹0.06/kWh (₹0.03/kWh in Per Unit Capacity Charges and ₹0.03/kWh in ECR) for meeting 450 mg/Nm<sup>3</sup> with “In Combustion Modification” alone.

gg) Modify the schedule and its consequent impact on the proposed ACE or the operational costs, if the need so arises.

### **Cost of Technology**

5. The Petitioner has submitted that based on the bidding and other associated costs, the estimated cost for ‘In Combustion Modification’ is ₹51.46 crore and for ‘In Combustion Modification with SNCR’ is ₹198.37 crore. The details are as follows:

(₹ in crore)			
Sl. No.	Description	In Combustion Modification (2X 525 MW)	In Combustion Modification + SNCR (2x525 MW)
1	NOx abatement System Base Cost		
1.1	De-NOx main package cost including Furnace CFD Analysis and LOI Analyser	33.08 <sup>#</sup>	131.35 <sup>@</sup>
1.2	Fire Fighting System	0	1
1.3	DCS Augmentation	2	4
1.4	Mercury Analyser	2	2
2	Total NOx abatement System Base Cost (1.1 +1.2+1.3+1.4)	37.08	138.35
3	Engineering & Project Management Cost (7% of Item 2)	2.60	9.68

4	Total Base Cost of the project (2 + 3)	39.68	148.04
5	GST (18 % of 4)	7.14	26.65
6	IEDC (Start-up Cost and Pre-operative expense)	0.00	3.13
7	Total NOx abatement System cost including taxes and duties (4 + 5 +6)	46.82	177.82
8	Contingency (5 % of 7)	2.34	8.89
9	Project Cost including Taxes & Duties, IEDC and contingency (7 +8)	49.16	186.71
10	IDC and Financial charges (as per scheduled flows)	2.31	11.66 <sup>\$</sup>
11	Opportunity Cost*	0	0
12	Total Project Cost (9+10+11)	51.46	198.37

(Note : # - L1 Bidder Quote; @ - As per offer received from bidder – ₹ 67.56 Cr for In combustion Modification and ₹. 63.80 Cr for SNCR; \$ - including Solid Urea prills; \* - opportunity shutdown i.e. carrying out activities during annual shutdown, otherwise, fixed charges for shutdown shall be considered)

6. Later, the Petitioner vide affidavit dated 9.6.2021 and 2.11.2021 submitted that with the revision of emission norms for NOx for TPPs installed during the period from 1.1.2004 to 31.12.2016 from 300 mg/Nm<sup>3</sup> to 450 mg/Nm<sup>3</sup> by MoEFCC vide Notification G.S.R. 662(E) dated 19.10.2020, the prayer (c) of the instant petition has become infructuous. The Petitioner is now seeking relief with respect to all other prayers w.r.t. norm of 450mg/Nm<sup>3</sup>. The Petitioner has proposed installation of only “In Combustion Control Technology” to bring the level of NOx emission below 450 mg/N in the Project.

### **Selection of Technology**

7. The Petitioner has submitted that in absence of any structured guidelines available from CEA, the Petitioner carried out the Feasibility Study of various available technologies and submitted to CEA along with letter dated 5.11.2018. The Feasibility Study was revised and the analysis of following technologies was submitted to CEA on 30.4.2020:

1. In Combustion Control
2. Post Combustion Control
  - a. Selective Non- Catalytic Reduction (SNCR)
  - b. Selective Catalytic Reduction (SCR)

8. The Petitioner has submitted that selection of De-NOx technology as a retrofit option mainly depends on technical, economic and commercial factors. The technical part includes existing NOx emission levels, NOx removal efficiency required, location of the plant (inland / coastal / access to reagent source), space requirements, outage requirements, layout feasibility, suitability of technology for Indian conditions. The economic factors include capital cost, operating cost (cost of reagent chemical, cost of utilities required and cost of increased APC). The commercial aspects include impact on tariff, reliable suppliers, proven technology and supplier guarantee.

9. The Petitioner has submitted that after preliminary study of all above technologies, it was concluded that "In Combustion Control" is the most suitable technology for meeting the norm of 450 mg/Nm<sup>3</sup> for the Project of the Petitioner for the following reasons:

- Low well-established In-Combustion Control technology on a variety of world coals with proven reliability.
- NOx emission removal in the range of 30% - 40%. However, coals with favorable FC/VM ratio, fuel Nitrogen can lead to removal efficiency upto 40%.
- Adequate and commercially viable suppliers offer this technology.
- No reagent is required

10. The Petitioner has submitted that it is difficult to do micro level cost-benefit analysis for individual plants such as the Petitioner's Project. The benefits of lowering NOx emission levels are essentially societal and macro in nature, in the shape of better health of public leading to lower mortality, incidental reduction in spending on health needs, reduction in soil acidification, reduced rain acidification, economic benefits of better productivity from healthier workforce. Further, overall reduction in level of NOx for society is dependent on collective action for reduction by all TPPs. Moreover, irrespective of result of such cost-benefit analysis, the installation of DeNOx system is mandated by the revised emission



norms in the form of governing law and there is no choice in the matter but to implement the law by installing the necessary equipment. The Petitioner has further submitted that the “in-principle” approval is necessary for securing financial support from lending institutes and achieve financial closure for implementation of the system within timelines.

11. The case was called for virtual hearing on 1.6.2021 and the Commission vide Record of Proceedings (RoP) dated 2.6.2021 directed the Petitioner to submit the following information on affidavit:

- i. Guaranteed value of maximum NOx emissions as agreed with OEM of Boiler;*
- ii. Actual level of NOx measured at full load;*
- iii. Status of implementation of abatement system to meet revised norms for NOx in view MoEFCC gazette notification dated 16.10.2020 relaxing NOx emissions to 450 mg/Nm<sup>3</sup>; and*
- iv. The emission levels of NOx during the last three years as submitted to the Pollution Control Board.”*

12. The Petitioner vide additional affidavit dated 9.6.2021 has submitted that the actual emissions of the units of the Petitioner are more than prescribed limit of 450 mg/Nm<sup>3</sup> and has prayed to grant relief associated with norm of 450 mg/Nm<sup>3</sup>. The Petitioner has further submitted that the design guarantee of NOx emission is 880 mg/Nm<sup>3</sup>. The bidding process was completed but contract is yet to be awarded. Petitioner has further submitted that the NOx level varies based on unit load, coal blending, mill combination, excess air etc. Thus, the emission at full load may not give picture about the worst operating conditions and the emissions at part load are higher than full load operation. The actual emission level data during 2018 -19 to 2020- 21, when the Units were operating at or around full load is as follows:

Unit 1			Unit 2		
Month	Load (MW)	NOx (mg/Nm <sup>3</sup> )	Month	Load (MW)	NOx (mg/Nm <sup>3</sup> )
<b>April 2018</b>	521.0	485.5	<b>April 2018</b>	520.0	512.2
<b>December 2018</b>	519.6	739.0	<b>December 2018</b>	519.3	664.7
<b>January 2019</b>	522.0	865.1	<b>January 2019</b>	517.3	830.2
<b>February 2019</b>	518.0	780.7	<b>February 2019</b>	519.0	739.3
<b>May 2019</b>	521.0	840.9	<b>May 2019</b>	520.0	783.4

<b>August 2019</b>	513.0	743.7	<b>August 2019</b>	514.0	698.5
<b>March 2020</b>	521.0	348.9	<b>March 2020</b>	516.0	789.1
<b>October 2020</b>	517.0	838.0	<b>October 2020</b>	515.0	676.8
<b>December 2020</b>	525.9	456.4	<b>December 2020</b>	521.0	496.2
<b>March 2021</b>	525.0	457.6			

13. As regards NOx emission levels during the last three years submitted to the Pollution Control Board, the Petitioner has submitted the quarterly NOx emission levels during 2018-19 to 2020-21 submitted to Jharkhand State Pollution Control Board (JSPCB) and the same is as follows:

Unit	Month	2018-19		2019-20		2020-21	
		Load (MW)	NOx (mg/Nm <sup>3</sup> )	Load (MW)	NOx (mg/Nm <sup>3</sup> )	Load (MW)	NOx (mg/Nm <sup>3</sup> )
Unit 1	April	521.0	485.5	434.0	761.6		
	May	362.0	561.4	521.0	840.9		
	June	442.0	585.9	358.8	845.2	304.0	811.8
	July	368.6	559.4	372.5	725.3		
	Aug	363.0	275.6	513.0	743.7	291.0	779.3
	Sept			295.7	764.7	319.0	718.6
	Oct	402.0	404.1	305.9	672.8	517.0	838.0
	Nov	470.0	492.4	478.3	703.0	509.0	697.4
	Dec	519.6	739.0	520.0	787.8	525.9	456.4
	Jan	522.0	865.1	478.0	884.9	518.4	456.2
	Feb	518.0	780.7	461.0	751.9	516.0	572.4
	Mar	483.0	809.9	521.0	348.9	525.0	457.6
Unit 2	April	520.0	512.2	489.5	833.4		
	May	347.0	489.0	520.0	783.4		
	June	500.0	496.9	345.4	249.3	308.0	776.3
	July	356.9	521.1				
	Aug	386.0	316.2	514.0	698.5	291.0	701.6
	Sept	393.0	245.1	295.5	719.4	276.0	662.0
	Oct			473.7	751.0	516.0	789.1
	Nov	460.0	520.2	496.5	7.6	515.0	676.8
	Dec	519.3	664.7	480.0	667.8	521.0	496.2
	Jan	517.3	830.2	467.0	799.0		
	Feb	519.0	739.3	451.0	728.9	482.0	558.7
	Mar	466.0	769.4	480.0	326.7	525.0	460.0

**Note:** Reports for some of the months are not available either because of Unit annual overhaul, Unit shutdown or because of lockdown.

14. The petition was admitted on 19.7.2021 and the Petitioner was directed to submit the corrected values of NOx measurements to 6% O<sub>2</sub> (dry basis) in line with MoEF&CC Notification dated 28.6.2018.

15. The Petitioner vide affidavit dated 27.7.2021 stated that the information submitted vide additional affidavit dated 10.6.2021 was calculated at 6% O<sub>2</sub> correction on dry basis and the same is corroborated with report of third party (Mitra S. K. Private Limited) who conducted the sampling and stack emission tests of the Project and submitted the reports to JSPCB.

16. The petition was again heard on 22.10.2021 and the Petitioner was directed to clarify the following:

- i. The head-wise envisaged capital cost for each of the solutions i.e. CFD analysis, low NOx burner, SOFA, combustion optimization etc.*
- ii. As the boilers already have low NOx burners, whether the Petitioner proposes to replace the same with new low NOx burners? If so, justification for such requirement and analysis carried out for CFD analysis, SOFA, combustion optimization etc. with existing low NOx burners.*

17. In response, the Petitioner vide additional affidavit dated 2.11.2021 has submitted that the price bid was invited on a lump sum basis including cost of CFD analysis and LOI analyser. Thus, the head wise capital cost for each solution i.e. low NOx burner, SOFA, combustion optimization etc. is not available with the Petitioner. However, out of the estimated ₹51.46 crore for 'In Combustion Modification', the cost of main De-NOx package is ₹33.08 crore, including Furnace CFD analysis cost of ₹0.15 crore and LOI Analyser cost of ₹3.95 crore. The Petitioner has further submitted that boilers of MPL are not provided with Low Nox Burner and are provided with conventional burners / burner tip but not with low NOx burners.

18. During the hearing on 20.5.2022, the learned counsel for the Petitioner submitted that the total estimated cost of 'Combustion Modification' of ₹51.46 crore is likely to escalate, as the L1 bidder conveyed that the validity of the quoted price was only upto 30.6.2021 and escalation thereof on account of inflation in last two years. The Petitioner will come up with final cost, after implementation of the subject works.

19. The Commission after hearing the learned counsel for the Petitioner reserved the order in the matter. The Respondents have neither participated in the hearing nor filed any reply in

the matter. Accordingly, the instant order is prepared after considering the submission made in the Petition and Petitioner's affidavits dated 9.6.2021, 26.7.2021 and 2.11.202.

### **Analysis and Decision**

20. We have considered the submissions of the Petitioner and perused documents available on record. It is observed that subsequent to MoEF&CC's notification, the Petitioner filed a Petition No. 72/MP/2016 before the Commission and sought in-principle approval for the expenditure proposed to be incurred to meet the revised emission norms w.r.t. SO<sub>2</sub> and NO<sub>x</sub>. The Commission vide order dated 20.3.2017 directed the Petitioner to approach CEA for specific optimum technology, associated cost and major issues to be faced in installation of revised environmental norms and to approach MoEF&CC for phasing the implementation of different environmental measures.

21. In order to expedite the implementation of environmental norms, the Petitioner sought approval of CEA for SO<sub>2</sub> system and NO<sub>x</sub> system separately. Accordingly, the Petitioner on 6.4.2017 approached MoEF&CC and CEA along with a pre-feasibility study report on FGD system. Central Pollution Control Board, MoEF&CC vide letter dated 11.12.2017, directed the Petitioner to install FGD System by September 2021 and June 2022 for Unit 1 and 2 respectively, and take immediate measures like installation of low NO<sub>x</sub> burners, providing Over Fire Air (OFA) etc. and comply with NO<sub>x</sub> emission limit by the year 2022. Subsequently, CEA vide letter dated 8.1.2019 provided the suggestive technology and indicative cost for installation of FGD system for the generating station of the petitioner. Accordingly, the Petitioner had filed separate Petition No. 152/MP/2019 before the Commission for approval of capital cost of FGD separately. The Commission vide order dated 11.11.2019 in Petition No. 152/MP/2019 accorded the in-principle approval for installation of FGD system.

22. In the meantime, on 14.11.2018, the Petitioner submitted feasibility study of proposed

NOx abatement system to CEA and subsequently, based on discussions with various vendors revised and updated subject report and submitted the same to CEA on 30.4.2020. The report mentions of two technologies i.e. 'In Combustion Control' and 'Post Combustion Controls' (SNCR and SCR). The 'In Combustion Control' is for abatement of NOx upto 450 mg/Nm<sup>3</sup> and 'Post Combustion Controls' (SNCR) for abatement upto 300 mg/Nm<sup>3</sup>.

23. Accordingly, the Petitioner in the interest of time and as a prudent measure, initially proposed to implement either the norm of 300 mg/Nm<sup>3</sup> through 'In Combustion' along with SNCR technology or to implement only 'In Combustion Control Technology' in first stage for meeting the norm of 450 mg/Nm<sup>3</sup> and the implementation of SNCR System in the second stage for meeting the norms of 300 mg/Nm<sup>3</sup>.

24. Thus, the Petitioner invited bids and discovered the price for 'In Combustion Technology' and received bidders estimated costs for 'In Combustion' along with SNCR, however, did not award the projects. Accordingly, sought the in-principle approval for implementation of ECS for abatement of NOx to 450 mg / Nm<sup>3</sup> as well as 300 mg / Nm<sup>3</sup> along with increase in APC, increase in SHR, working capital for SNCR, increase in O&M expenses etc.

25. Subsequent to MoEF&CC's notification dated 16.10.2020, wherein, the NOx was revised to 450 mg/Nm<sup>3</sup>, the Petitioner has withdrawn prayers pertaining to NOx abatement system for 300 mg / Nm<sup>3</sup>. Accordingly, the submissions and prayers of the Petitioner w.r.t. 450 mg/ Nm<sup>3</sup> i.e. 'In Combustion Control Technology' are considered in this order.

26. It is also observed that the MoEF&CC vide notification dated 31.3.2021 has categorized the TPP's based on their location and extended the timelines for the implementation of environment norms and exempted these compliances for the units retiring within the specified timelines. The details in brief are as follows:

Sl. No.	Category	Location / Area	Timelines for compliance	
			Non-retiring units	Retiring units
1	Category A	Within 10 km radius of National Capital Region or cities having million plus population, as per census 2011	Upto 31 <sup>st</sup> December, 2022	Upto 31 <sup>st</sup> December, 2022
2	Category B	Within 10 km radius of Critically polluted areas or non-attainment cities, as defined by CPCB	Upto 31 <sup>st</sup> December, 2023	Upto 31 <sup>st</sup> December, 2025
3	Category C	Other than those included in category A and B	Upto 31 <sup>st</sup> December, 2024	Upto 31 <sup>st</sup> December, 2025

27. Further, MoEF&CC vide notification dated 5.9.2022 revised/ extended the timelines for implementation of ECS norms. The details in brief are as follows:

Sl. No.	Category	Location / Area	Timelines for compliance (Non-retiring units)		Last date for retirement of units for exemption from compliance	
			Parameters other than SO <sub>2</sub> emissions	SO <sub>2</sub> emissions	Parameters other than SO <sub>2</sub> emissions	SO <sub>2</sub> emissions
1	Category A	Within 10 km radius of National Capital Region or cities having million plus population, as per census 2011	Upto 31 <sup>st</sup> December, 2022	Upto 31 <sup>st</sup> December, 2024	Upto 31 <sup>st</sup> December, 2022	Upto 31 <sup>st</sup> December, 2027
2	Category B	Within 10 km radius of Critically polluted areas or non-attainment cities, as defined by CPCB	Upto 31 <sup>st</sup> December, 2023	Upto 31 <sup>st</sup> December, 2025	Upto 31 <sup>st</sup> December, 2025	
3	Category C	Other than those included in category A and B	Upto 31 <sup>st</sup> December, 2024	Upto 31 <sup>st</sup> December, 2026	Upto 31 <sup>st</sup> December, 2026	

28. As per the information furnished by the Petitioner and submitted to JSPCB, it is observed that the monthly average NO<sub>x</sub> emission of the units of the generating station are generally higher than prescribed norm of 450 mg/ Nm<sup>3</sup>, however, for few months the emissions are lower than the norm of 450 mg/ Nm<sup>3</sup>. In response to query of the Commission,

the Petitioner submitted that the NOx emission depends on unit load, coal blending, mill combination, excess air etc., and the emissions at part load are higher than full load operation. Accordingly, the Commission is of the view that though at times, under specific conditions, the Petitioner by controlling various parameters, able to achieve the NOx emissions upto 450 mg/Nm<sup>3</sup>, implementation of 'In Combustion Control Technology' is necessary for consistent abatement of NOx below 450 mg/Nm<sup>3</sup>, particularly, the balance useful life of the plant is being around 15 years.

29. Implementation of solutions based on the CFD analysis, Low NOx Burner, Separated Over Fire Air Ports (SOFA), combustion optimization etc. reduces the NOx emissions for operation of unit in 40% - 100% load range. However, it may also result in increase in unburnt carbon, which necessitates for advanced pulverizers, hardware and software tools for balanced fuel distribution. This technology may necessitate for higher SHR i.e. around 22 kCal / kCal. The total estimated cost, based on 'L1 bidder' is ₹51.46 crore which includes main package (including Furnace CFD analysis and LOI analyser) of ₹33.08 crore, DCS augmentation system (₹2 crore), Mercury Analyser (₹2 crore), GST @ 18 % (₹7.14 crore), IDC and financial charges (₹2.31 crore) and Contingency (₹2.34 crore). As per the estimations of the Petitioner, considering the balance useful life of the units, the additional tariff is of ₹. 0.06/kWh (₹0.03/kWh in Per Unit Capacity Charges and ₹0.03/kWh in ECR).

30. Further, Regulations 11, 26 and 29 of the 2019 Tariff Regulations, enables a generating company to seek in-principle approval and incur/ claim additional capitalization to meet the revised emission norms, which read as follows:

***“11. In-principle approval in specific circumstances:*** *The generating company or the transmission licensee undertaking any additional capitalization on account of change in law events or force majeure conditions may file petition for in-principle approval for incurring such expenditure after prior notice to the beneficiaries or the long term customers, as the case may be, along with underlying assumptions, estimates and justification for such expenditure if the estimated expenditure exceeds 10% of the admitted capital cost of the project or Rs.100 Crore, whichever is lower.”*

**“26. Additional Capitalisation beyond the original scope**

*(1) The capital expenditure, in respect of existing generating station or the transmission system including communication system, incurred or projected to be incurred on the following counts beyond the original scope, may be admitted by the Commission, subject to prudence check:*

....

*(b) Change in law or compliance of any existing law;”*

**“29. Additional Capitalization on account of Revised Emission Standards:** *(1) A generating company requiring to incur additional capital expenditure in the existing generating station for compliance of the revised emissions standards shall share its proposal with the beneficiaries and file a petition for undertaking such additional capitalization.*

*(2) The proposal under clause (1) above shall contain details of proposed technology as specified by the Central Electricity Authority, scope of the work, phasing of expenditure, schedule of completion, estimated completion cost including foreign exchange component, if any, detailed computation of indicative impact on tariff to the beneficiaries, and any other information considered to be relevant by the generating company.*

*(3) Where the generating company makes an application for approval of additional capital expenditure on account of implementation of revised emission standards, the Commission may grant approval after due consideration of the reasonableness of the cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, and such other factors as may be considered relevant by the Commission.*

*(4) After completion of the implementation of revised emission standards, the generating company shall file a petition for determination of tariff. Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on reasonableness of the cost and impact on operational parameters shall form the basis of determination of tariff.”*

31. In line with the above provisions of the 2019 Tariff Regulations, the Petitioner has filed the instant Petition seeking the in-principle approval for ECS required to comply with NOx norms of MoEF&CC. The Petitioner has submitted the proposal along with scope of works, scheduled completion, estimated cost, indicative impact on tariff etc. to the concerned beneficiaries. Thus, the Petitioner has complied with the Regulation 29(1) of the 2019 Tariff Regulations. However, no comments have been received.

32. The Petitioner has invited bids for ‘In Combustion Technology’ for abatement of NOx within 450 mg/ Nm<sup>3</sup>, wherein, 4 vendors submitted valid financial bids and bidding process was completed on 30.9.2019. The estimated price for the ‘In Combustion Technology’, as per the ‘L1 bidder’ was ₹51.46 crore for 1050 MW (2 x 525 MW) of the generating station. This estimated cost of ₹51.46 crore, includes main package (including Furnace CFD analysis and LOI analyser) of ₹33.08 crore, DCS augmentation system (₹2 crore), Mercury Analyser (₹2 crore), GST @ 18 % (₹7.14 crore), IDC and financial charges (₹2.31 crore) and Contingency



(₹2.34 crore). As the bid was issued a lumpsum, the Petitioner does not have the head wise capital cost for each solution i.e. low NOx burner, SOFA, combustion optimization, etc. The Petitioner has also submitted that the quoted price of L1 bidder was only valid till 30.6.2021, with minor escalation.

33. As regards O&M charges, the Petitioner has submitted that this technology may necessitate higher SHR i.e. around 22 kCal/ kCal and as per the estimations, considering the balance useful life of the units, the additional tariff on account of implementation of ECS for abatement NOx upto 450 mg/ Nm<sup>3</sup> is of ₹0.06/kWh (₹0.03/kWh in Per Unit Capacity Charges and ₹0.03/kWh in ECR). However, it is observed that these claims are based on the preliminary estimations of the Petitioner and actual impact can be assessed only after actual implementation of the NOx system for the generating station and other similar size of units. As per Regulation 29(4) of the 2019 Tariff Regulations, after completion of the implementation of revised emission standards, the generating company shall file a petition for determination of tariff. Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on reasonableness of the cost and impact on operational parameters shall form the basis of determination of tariff. Accordingly, the prayers of the Petitioner for the grant of additional APC, Gross Station Heat Rate, additional water charges, spares, additional O&M Expenses, landed cost of reagents and deemed availability on account of shutdown, etc. are not considered in the instant order, as the instant petition is for in-principle approval for implementation of 'In Combustion Technology' and the same would arise only after the ECS system is installed and becomes operational. Accordingly, we would consider them in petition to be filed by the Petitioner under Regulation 29(4) of the 2019 Tariff Regulations, after the installation of NOx control system. Further, the Commission has introduced a separate tariff stream for ECS by amending the 2019 Tariff Regulations vide the 2020 Amendment Regulations. Accordingly, the Petitioner's claim towards grant of additional

APC, additional water consumption and additional O&M Expenses, etc. shall be dealt as per the amended 2019 Tariff Regulations.

34. The Petitioner has approached the Commission for in-principle approval of the capital cost for implementation of NOx control system. The Petitioner has claimed estimated price of ₹51.46 crore for implementation of the 'In Combustion Technology' in its generating station (2 x 525 MW), which includes main package (including Furnace CFD analysis and LOI analyser) of ₹33.08 crore, DCS augmentation system (₹2 crore), Mercury Analyser (₹2 crore), GST @ 18 % (₹7.14 crore), IDC and financial charges (₹2.31 crore) and Contingency (₹2.34 crore). The CEA has specified the suitable technology and the indicative capital cost of the Wet Limestone Based FGD for reduction of SO<sub>2</sub> emissions. However, no such indicative capital cost is available in the case of NOx control system. The Commission vide combined order dated 28.4.2021 in Petition No.335/MP/2020 & Others, approved the hard cost for implementation of the Combustion Modification System for NOx control system in case Vindychal Super Thermal Power Station, Korba Super Thermal Power Station, Mauda Power Thermal Power Station and Sipat Super Thermal Power Station. Further, the Commission vide order dated 28.9.2021 in Petition No. 597/MP/2020 in case of NTPC SAIL and order dated 7.5.2022 in Petition No.393/MP/2019 in the case of Aravali Power Company Private Limited had accorded in-principle approval of the hard cost towards implementation of NOx control system discovered through bidding. The details of the in-principle approvals granted by the Commission for installation of the NOx control system is given in the table below. In the instant case, the Petitioner has indicated hard cost of ₹37.08 crore (Furnace CFD analysis and LOI analyzer of ₹33.08 crore, DCS augmentation system of ₹2 crore and Mercury Analyser of ₹2 crore) for implementation of NOx control system. It is observed from the table below that the hard cost claimed by the Petitioner in the instant case is much higher than the hard cost approved in the case of NTPC, NTPC SAIL and Aravali Power Company

Petition No. & date of order	Petitioner	Generating Station /Capacity (MW)	Date of IFB & NoA	Cost Approved for Combustion Modification System (₹ in crore)
335/MP/2020 & Ors 28.4.2021	NTPC	(i) VSTPS-III (2x500 MW)	IFB:31.7.2017 NOA:18.9.2018	17.74
		(ii) VSTPS-IV (2x500 MW)	IFB:31.7.2017 NOA:18.9.2018	17.74
		(iii) KSTPS-III (500 MW)	IFB 28.9.2018 NOA:22.8.2020	8.76
		(iv) MSTPS-I (2x500 MW)	IFB:31.7.2017 NOA:18.9.2018	18.28
		(v) SSTPS-II (2X500 MW)	IFB:24.4.2020 NOA: -NA-	12.92
Petition No. 597/MP/2020 28.9.2021	NTPC SAIL	2x250 MW	IFB:31.8.2018 NoA:26.8.2019	14.00
Petition No. 393/MP/2019 7.5.2022	Aravali Power Company Private Limited,	3x500 MW	IFB:24.11.2018 NOA:29.4.2019	16.94
Petition No. 606MP/2020	MPL	2x525 MW		Claimed 37.08

35. As the hard cost of NOx control system claimed by the Petitioner is much higher, we are not inclined to approve the same at this stage. The Petitioner is directed to adopt prudent methods of transparent competitive bidding and arrive at more economical and reasonable capital/ hard cost of the NOx control system in the interest of beneficiaries and the consumers. However, we accord “in-principle” approval for implementation of ‘In Combustion Technology’ in its generating station (2x 525 MW) and the Petitioner is granted liberty to approach the Commission after of the implementation of ‘In Combustion Technology’ for further consideration in accordance with Regulation 29(4) of the 2019 Tariff Regulations. Further, the Petitioner is directed to proceed for implementation NOx abatement system in line with the

timelines issued by the MoEF&CC from the time to time, in consultation with the beneficiaries.

36. The Petitioner has also prayed for modification of the granted LTA on account of reduction in the Net Capacity of Project due to proposed ECS installation. The Petitioner has made similar prayer in Petition No.152/MP/2019. In this regard, the Commission in order dated 11.11.2019 in Petition No.152/MP/2019 has already held that the Petitioner has to invoke the provision of LTA and the 2009 Regulations for any reduction of LTA in accordance with law. As such, we are not inclined to dwell on this issue in this order. The relevant portion of the order dated 11.11.2019 is as follows:

*“41. The Petitioner in the instant petition has prayed for requisite modification in the LTA granted on account of reduction in the Net Capacity of the generating station due to increase in Auxiliary Consumption in regard to FGD installation. It is observed that the reduction of LTA capacity is governed as per their provision of LTA Agreement and the CERC (Connectivity, Long term Access and Medium Term Open Access) Regulations, 2009 and subsequent amendment thereof. The Petitioner has to invoke the provision of LTA and connectivity regulations for any reduction of LTA in accordance with Law.....”*

37. As regards the Petitioner’s prayer to not consider the increased ECR on account of installation of De-Nox installation for the purpose of preparation of stack of merit order dispatch, the Commission in order dated 11.11.2019 in Petition No.152/MP/2019 filed by the Petitioner has already observed as under. Therefore, we do not find any reason to further dwell on this issue in this order.

*“39. The dispatch of the generating station depends on the requisition by the beneficiaries of such generating station. All the beneficiaries may not be purchasing the electricity from same generating stations. The merit order for dispatch is worked out by each beneficiary based on the principle of marginal cost. The marginal cost of each beneficiary is different and therefore, the merit order for dispatch will also be different. In this context, the Ministry of Power, on 30.7.2019, issued direction u/s 107 of the Act, to address this issue as under:*

*“3. The Phasing of the implementation of the new environmental norms has been reviewed. Accordingly, it is directed that the impact of operating costs incurred in the implementation of new Environmental Norms shall not be considered for Merit Order Dispatch of Coal Based Thermal Power Stations till 31.12.2022. For this purpose, CERC shall advise a methodology of supplementary tariff determination separately from normal tariff so that installation of FGD/other ECS has no bearing on the merit order dispatch till 31.12.2022.”*

40. As per Clause (2) of the Regulation 14 of the 2019 Tariff Regulations, the

*Commission has already specified the regulatory framework for determination of supplementary tariff inter-alia provides supplementary capacity charges and supplementary energy charges. This regulation is effective for 2019-24 tariff period. The Commission will determine this supplementary tariff on submission of application by the petitioner after installation of FGD. As such, state/beneficiaries may decide merit order dispatch while scheduling the plants. Accordingly, prayer (g) of the petitioner is disposed in terms of above.”*

38. Petition No. 606/MP/2020 is disposed of in terms of the above discussions and findings.

**sd/-  
(P. K. Singh)  
Member**

**sd/-  
(Arun Goyal)  
Member**

**sd/-  
(I. S. Jha)  
Member**